REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This Amendment is in response to the Office Action dated August 3, 2004. Appreciation is expressed for the indication of allowable subject matter in claim 4. By the present Amendment, claim 1 has been amended to incorporate the subject matter of its dependent claims 3 and 4, thus effectively rewriting claim 4 into independent for to incorporate all of the limitations of its parent claims 1 and 3. Claim 2 remain dependent on the amended claim 1.

In addition, by the present Amendment, the remaining claims 5-14 (together with claims 3 and 4, which would now be redundant) have been cancelled, without prejudice, and replaced by new claims 15-28. As will be discussed below, each of the newly presented independent claims 15, 21, 23, 26, 27 and 28 specifically defines a feature of the inclusion of an error concealment method indicator in an encoded video signal which is neither taught nor suggested by any of the cited prior art, including the references relied on in the rejection of the claims in the August 3, 2004 Office Action. This feature was found, for example, in previously pending independent claims 6, 7 and 11. On the other hand, features found previously in independent claims 1, 5, 8, 9 and 10 have now been placed in dependent claims. It is noted that this is done without prejudice to the Applicants' right to pursue the subject matter previously found in claims 1, 5, 8, 9 and 10 in a Continuation application.

Briefly, as noted above, the claimed invention is particularly directed to an improved method and structure to determine appropriate error concealment methods

to reduce the undesirable visual effect of errors which sometimes occur during the decoding of encoded video signals. Unlike the prior art, the present claimed invention resolves such difficulties through the use of an error concealment method indicator which is provided in the encoded video signal. This error concealment method indicator provides an indication as to whether temporally-predictive error concealment method should be used or, alternatively, a non-temporally-predictive (i.e., spatial) error concealment method should be used during the decoding of the picture of the encoded video signal.

These features are discussed, for example, in the specification. Referring to page 6, line 26 et seq. of the specification, for example, it is noted that an indicator to determine the appropriate type of error concealment method is provided in the encoded video signal to assist the decoder in selecting the appropriate type of error concealment method. Page 7 of the specification provides a more specific discussion of the use of the error concealment method indicator in the encoded video signal, while page 8, line 7 et seq. notes that the error concealment method indicator can be included with respect to either the whole picture or a part of the picture. Fig. 4 and pages 16 to 18 define further specifics of the error concealment method indicator. By virtue of these arrangements, improved error concealment is obtained.

Reconsideration and allowance of newly presented independent claims 15, 21, 23, 26, 27 and 28, and their respective dependent claims, over the cited references to Choon (USP 5,410,553), Reed (USP 6,351,493) and Sato (USP 6,515,695) relied on in rejections against the original claims, is respectfully requested, whether these references are considered alone or in combination with

one another. As noted above, each of the independent claims 15, 21, 23, 26, 27 and 28 now defines the important feature of providing an error concealment method indicator in the encoded video signal to indicate the type of error concealment method to be used in the decoding process. It is respectfully submitted that none of the cited references, including the references to Choon, Reed and Sato relied on in the rejections set forth in the Office Action, teach or suggest such a use of error concealment method indicators in an encoded video signal to reduce the visual effect of error during decoding. Accordingly, reconsideration and removal of the 35 U.S.C. § 103 rejection set forth in the Office Action is respectfully requested. Regarding this, the following detailed discussion of the references serves to indicate the clear differences between the techniques used in these references and the claimed features of the use of the error concealment method indicator in the encoded data to indicate the type of error concealment method to be used in the decoding process.

Choon relates to error concealment during decoding of an encoded video signal. Choon's error concealment system includes an error correction part (70 in Figure 4) which attempts to correct errors present in the encoded video signal (column 4, lines 47 to 49). When a non-correctable error is detected in a picture (frame) of the encoded video signal, Choon teaches that error concealment is applied on a (macro)block-by-(macro)block basis to conceal the effects of the non-correctable error, controlled by error concealment control part (80 in Figure 4).

Error concealment is performed in accordance with mode information (column 4, lines 60 to 64), which indicates an encoding mode used to encode the picture in question (column 2, lines 34 to 38). More specifically, Choon teaches that when a

non-correctable error occurs and error concealment is performed, a check is first made to determine whether the mode information is correct (step 100, column 4, line 66 to column 5, line 1).

If the mode information is correct, a decision is made on how to conceal the non-correctable error. The selection of an error concealment method depends on the encoding mode. For example, if a picture has been encoded using INTRA coding mode, i.e. it has been encoded without reference to any other picture of the video signal (column 5, lines 7 to 9), then the error is concealed by interpolation (step 900, column 5, lines 9 to 11). In a situation where the picture has not been encoded in INTRA mode, i.e. it has been encoded in a predictive manner from at least one other picture in the video signal, Choon teaches that motion vectors associated with the (macro)block containing the non-correctable error are checked and error concealment is performed in different ways (either by interpolation or substitution) depending on which (if any) motion vectors contain errors (column 5, lines 11 to 44). For example, if neither of the motion vectors contains an error, the error in the (macro)block is concealed by interpolation using both of the motion vectors (column, lines 20 to 25 and Figure 5).

Therefore, Choon does not disclose provision of a separate error concealment method indicator, as proposed by the present invention.

The second document cited by the Examiner, Reed, concerns a method and apparatus for detecting scene changes. More specifically, the video coding system proposed by Reed determines whether to encode a given frame (picture) of a video signal in INTRA-coding mode (I-frame) or a predictive coding mode (P-frame) and

provides information about the coding type of each frame in header information for the frame (column 3, lines 58 to 65).

For each frame, the video encoding system 100 determines for each macroblock of that frame whether the macroblock should be coded in INTRA coding mode or a predictive coding mode. A frame that has a large number of INTRA-mode macroblocks indicates that motion compensation has failed and, therefore, that the frame is significantly different from the previously coded frame. The scene change detector infers a scene change from the large number of INTRA-coded macroblocks and sets the frame type to INTRA, that is, the frame and all of the macroblocks in the frame are designated for INTRA-coding (column 4, lines 5 to 13).

Thus, although Reed does provide an encoding method indicator, it does not relate to the selection of error concealment methods or to the provision of an error concealment method indicator. Therefore, it is arguable that the teachings of Choon are more relevant to the present invention than those of Reed, and accordingly, subsequent argumentation focuses more on the teachings of Choon than those of Reed.

In response to the claim rejections raised by the Examiner, the following points should be noted.

Firstly, the combination of Choon's teachings with those of Reed would not lead to the claimed invention, as neither document teaches or suggests the provision of a separate error concealment method indicator.

Secondly, knowing the disclosure of Choon, i.e. selecting an error concealment method on the basis of an encoding mode indicator for a picture, it would be counter-intuitive for a person skilled in the art to provide a separate error

concealment method indicator to the encoded video signal, since this would lead to a

decrease in coding efficiency i.e. more encoded data would be required to convey

equivalent information. This contravenes the general and well-known objective of

video coding, namely to reduce the amount of data required to represent a video

sequence.

Thirdly, providing an error concealment method indicator that is separate from

the encoding mode indicator for a picture provides a technical advantage compared

with the method disclosed in Choon. In particular, the inventor of the present

invention has realized that an indication of encoding mode is not necessarily a

reliable indicator for selection of an error concealment method.

For example, a picture of a video sequence encoded using a temporally

predictive coding mode (e.g. an INTER-coded P picture) may contain blocks or

segments encoded using an INTRA-coding mode. This happens because video

encoders are typically arranged to select an encoding mode to provide the best

possible compression efficiency, and it may be more efficient to encode certain

regions of a picture, otherwise encoded using a temporally predictive coding mode,

in a non-temporally predictive manner (i.e. using INTRA-coding). This may be the

case when a particular picture contains appearing objects, uncovering background,

or transformations that cannot be represented by the motion model employed by the

video coding method. As a result, there are sometimes INTRA-coded blocks or

segments in pictures that are otherwise encoded using a temporally predicted coding

mode (as evidenced by Reed, see column 3, line 58 to column 4, line 4). Thus, a

simple indication of an encoding mode for a picture may not be sufficient to provide a

reliable indication of the best error concealment method to be applied to all image

blocks or regions within a given picture. i.e. there is not necessarily a correlation between a coding mode indication and an appropriate choice of concealment method.

It should also be appreciated that some video encoders that are adapted to encode video sequences using a combination of INTRA-coded pictures (i.e. pictures that are encoded without the use of temporal prediction) and pictures encoded using temporal prediction (e.g. INTER coded P pictures and / or bi-directionally predicted B pictures), are also arranged to insert pictures encoded in INTRA-coding mode into the encoded video signal at regular intervals. This, thereby provides random access points into the encoded video signal.

Thus, in this type of coding scheme, INTRA-coded pictures are not only used at scene changes where the image content of the pictures to be coded changes significantly, but also during sequences of INTER-coded pictures which are likely to have similar image content. In this situation, it may be particularly inappropriate to rely on an encoding mode indicator to provide information relating to an appropriate error concealment method to be used should an error occur. This is because errors in some INTRA-coded pictures, specifically those present at scene changes, cannot be concealed using temporally-predictive error concealment methods and should be concealed using a non-temporally predictive error concealment method, while conversely, errors in other INTRA-coded pictures, especially those introduced in sequences of INTER-coded pictures to provide random access points, may be better concealed using temporally-predictive error concealment methods.

In this kind of video coding scenario, the method of Choon in which an encoding mode indicator for a picture is also used as an error concealment method

indicator, would not necessarily identify the most appropriate error concealment method to be used in all situations.

With regard to the Sato reference, although Sato is of general interest with regard to its teachings of a portable video phone system containing a video codec for a display and the recording of MPEG-4 video, as noted in the Office Action, it is respectfully submitted that nothing in this reference at all suggests anything to make up for the shortcomings of the primary references to Choon and Reed in terms of meeting the claim limitations for providing a separate error concealment indicator as part of an encoded video signal to indicate the type of error concealment method to be used in the decoding process.

For the reasons set forth above, it is respectfully submitted that each of the independent claims 15, 21, 23, 26, 27 and 28 clearly defines over the cited prior art, and, accordingly reconsideration and allowance of the newly presented claims 15-28 is respectfully requested.

With regard to the dependent claims, it is noted that these claims set forth even further distinctions over the cited prior art. With regard to this, as noted at the outset of the remarks, dependent claims, such as claims 16, 22, etc. define specific features concerning the calculation of similarity between the first and second features and the use of measure of similarity in conjunction with the error concealment method indicator to determine the use of either a temporally predictive error concealment method or a non-temporally predictive error concealment method. It is respectfully submitted that these dependent claims serve to even further define the distinctions over the cited prior art, and, accordingly, particular consideration and allowance of these dependent claims is also respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 1344.40118X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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